



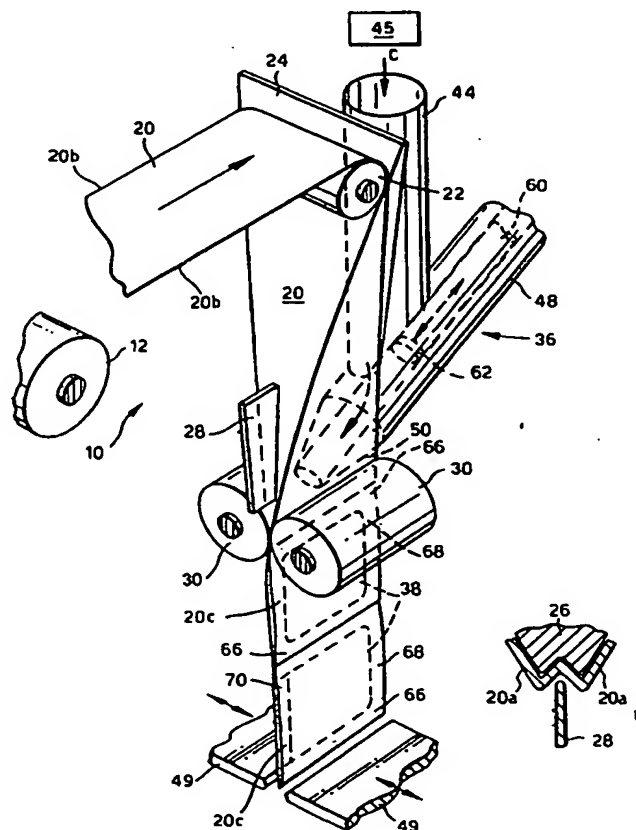
## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification <sup>6</sup> : <b>B65B 29/00</b>	<b>A2</b>	(11) International Publication Number: <b>WO 99/47423</b> (43) International Publication Date: 23 September 1999 (23.09.99)
<p>(21) International Application Number: PCT/GB99/00761</p> <p>(22) International Filing Date: 15 March 1999 (15.03.99)</p> <p>(30) Priority Data: 9805525.4 13 March 1998 (13.03.98) GB</p> <p>(71) Applicant (for all designated States except US): MOLINS PLC [GB/GB]; 11 Tanners Drive, Blakelands, Milton Keynes MK14 5LU (GB).</p> <p>(72) Inventors; and (75) Inventors/Applicants (for US only): BAILEY, Thomas, William [GB/GB]; 13 Westwood Way, Westwood Business Park, Coventry CV4 8HS (GB). SEAWARD, David, Robert [GB/GB]; 13 Westwood Way, Westwood Business Park, Coventry CV4 8HS (GB).</p> <p>(74) Agents: BALDWIN, Mark et al.; Molins plc, Group Patent Dept., Haw Lane, Saunderton, High Wycombe, Bucks HP14 4JE (GB).</p>		<p>(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).</p> <p><b>Published</b> Without international search report and to be republished upon receipt of that report.</p>

(54) Title: PACKAGING

## (57) Abstract

Apparatus for manufacturing a DOY bag includes flow formers (24, 28) for causing a moving web (20) to have a transverse cross section which comprises two arms (20a) each having a free end coinciding with a respective lengthwise extending edge (20b) of the web and a portion interconnecting the arms which extends inwardly into the space between the arms. Heated sealing rollers (30) disposed downstream of the flow formers seal the web to form successive closed compartments (38). A device (36) feeds a flowable material into the space between the arms (20a) at a position upstream of the sealing rollers (30) such that each compartment (38) contains a predetermined amount of the flowable material. The apparatus preferably operates continuously producing between 300 and 1000 bags per minute.



**FOR THE PURPOSES OF INFORMATION ONLY**

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav	TM	Turkmenistan
BF	Burkina Faso	GR	Greece		Republic of Macedonia	TR	Turkey
BG	Bulgaria	HU	Hungary	ML	Mali	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MN	Mongolia	UA	Ukraine
BR	Brazil	IL	Israel	MR	Mauritania	UG	Uganda
BY	Belarus	IS	Iceland	MW	Malawi	US	United States of America
CA	Canada	IT	Italy	MX	Mexico	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NE	Niger	VN	Viet Nam
CG	Congo	KE	Kenya	NL	Netherlands	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NO	Norway	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's	NZ	New Zealand		
CM	Cameroon		Republic of Korea	PL	Poland		
CN	China	KR	Republic of Korea	PT	Portugal		
CU	Cuba	KZ	Kazakstan	RO	Romania		
CZ	Czech Republic	LC	Saint Lucia	RU	Russian Federation		
DE	Germany	LI	Liechtenstein	SD	Sudan		
DK	Denmark	LK	Sri Lanka	SE	Sweden		
EE	Estonia	LR	Liberia	SG	Singapore		

1       Packaging

2  
3           The invention relates to the packaging of flowable materials  
4 and particularly, but not exclusively, to packaging tea or coffee  
5 in small porous bags which permit brewing of their content whilst  
6 in the bag.

7           A known form of packaging for flowable materials is the  
8 so-called DOY bag. DOY bags are typically made of a plastics  
9 material and are produced in relatively large sizes to contain  
10 flowable materials such as soups, washing-up liquids and powders  
11 or pet foods.

12           Conventionally, DOY bags are made by running a heat sealable  
13 plastics web in a horizontal direction over a former and through  
14 heated sealing rolls to produce a bag-like container which has a  
15 generally W-section at its lower end and is open at the top.  
16 Portions of the lower end of the bag are sealed to increase the  
17 stiffness of the bag in this region whilst retaining the  
18 W-section, so forming a base on which the bag can stand. The bag  
19 is filled from above and its top is then sealed prior to  
20 separation from the web. This process is intermittent rather than  
21 continuous and a typical production speed would be 100 bags per  
22 minute.

23           The invention provides apparatus for use in manufacturing  
24 packaging containing a flowable material, said apparatus  
25 comprising flow forming means for causing a moving web to have a  
26 transverse cross-section which comprises two arms and a portion  
27 interconnecting said arms which portion extends inwardly into a  
28 space defined between said arms, sealing means disposed downstream  
29 of said forming means for sealing said web to define successive  
30 closed compartments and means for feeding a flowable material into  
31 said space between said arms at a position upstream of said  
32 sealing means such that each said compartment contains a  
33 predetermined amount of said flowable material.

34           The invention also includes a method of manufacturing  
35 packaging containing a flowable material comprising the steps of:

- 36           (i) causing a moving web to have a transverse  
37 cross-section which comprises two arms and a portion  
38 interconnecting said arms which portion extends

- 1 inwardly into a space defined between said arms;
- 2 (ii) forming a first seal and subsequently a second seal,
- 3 said seals being spaced apart in the lengthwise
- 4 direction of said web and each extending across said
- 5 web in a lengthwise direction of said arms;
- 6 (iii) forming a third seal extending between said first seal
- 7 and said second seal in said lengthwise direction of
- 8 the web in the region of said lengthwise extending
- 9 edges so as to define a closed compartment; and
- 10 (iv) feeding a predetermined amount of a flowable material
- 11 into said space between said arms prior to forming
- 12 said second seal and at least prior to completion of
- 13 said third seal such that said material will be
- 14 contained in said compartment.

15 The invention also includes apparatus for use in

16 manufacturing packaging containing a flowable material, said

17 apparatus comprising forming means for causing a moving web to

18 have a transverse cross-section which comprises two arms and a

19 portion interconnecting said arms which portion extends into a

20 space defined between said arms, means for feeding a flowable

21 material into said space between said arms and sealing means for

22 sealing said web so as to define successive compartments each

23 containing a predetermined amount of said flowable material, the

24 arrangement being such that said web moves downwardly past said

25 forming means, feeding means and sealing means.

26 The invention also includes a method of manufacturing

27 packaging containing a flowable material comprising the steps of:

- 28 (i) causing a web to move in a downwards direction;
- 29 (ii) causing said downwardly moving web to have a
- 30 transverse cross-section which comprises two arms and
- 31 a portion interconnecting said arms which portion
- 32 extends inwardly into a space defined between said
- 33 arms;
- 34 (iii) feeding a flowable material into said space; and
- 35 (iv) sealing said web so as to define successive
- 36 compartments each containing a predetermined amount of
- 37 said flowable material.

38 Certain materials which are flowable do not flow readily.

1 One such material is roast and ground coffee which does not flow  
2 as nearly readily as, for example, tea. In order to fill a  
3 bag-like container with ground coffee it is desirable to provide a  
4 dosing system which pumps the coffee into the container; this is  
5 particularly the case if processing speeds in excess of 100 bags  
6 per minute are to be achieved.

7 The invention also includes a device for feeding a  
8 predetermined amount of flowable material into a container, said  
9 device comprising inlet means for receiving said flowable  
10 material, means defining at least one dosing chamber, means for  
11 driving said flowable material from said inlet means to the or  
12 each said dosing chamber, and reciprocating means movable through  
13 the or each said dosing chamber to drive a predetermined amount of  
14 said flowable material into said container.

15 The invention also includes a device for feeding a  
16 predetermined amount of flowable material into a container, said  
17 device comprising means defining at least one outlet, means  
18 defining a plurality of dosing chambers, inlet means for receiving  
19 said flowable material, means for driving said flowable material  
20 from said inlet means to said dosing chambers, means for pushing  
21 said flowable material out of said dosing chambers to said outlet  
22 defining means and means for causing relative reciprocal movement  
23 between said outlet defining means and said chamber defining  
24 means, the arrangement being such that each said chamber can be  
25 positioned in alignment with said pushing means and said outlet  
26 means whilst the or at least one other chamber receives flowable  
27 material from said inlet means.

28 In order that the invention may be well understood, some  
29 embodiments thereof, which are given by way of example only, will  
30 now be described with reference to the drawings, in which:

31 Figure 1 is a schematic perspective view of an apparatus for  
32 use in manufacturing packaging containing a flowable material;

33 Figure 2 is a scrap section showing the formation of a  
34 W-section in a web by means of the apparatus of Figure 1;

35 Figure 3 is an elevational view of a heated sealing roller  
36 of the apparatus shown in Figure 1;

37 Figure 4 is a schematic representation of a feeding device  
38 of the apparatus of Figure 1;

1           Figure 4a shows a modification to the feeding device of  
2       Figure 4;

3           Figure 5 shows the closed end of a W-section web containing  
4       a dose of flowable material prior to sealing of the lengthwise  
5       extending edges of the web;

6           Figure 6 shows the W-section web after sealing of its closed  
7       end;

8           Figure 7 is a perspective view showing alternative heated  
9       sealing rollers;

10          Figure 8 shows an alternative feeding device; and

11          Figure 9 shows yet another alternative feeding device.

12          An apparatus 10 for use in the manufacture of packaging  
13       containing a flowable material is illustrated by Figures 1 to 4.  
14       In the description which follows, the apparatus 10 will be  
15       described in connection with the manufacture of coffee bags made  
16       of a porous material so as to be suitable for infusion in a mug or  
17       like container. However, it is to be understood that the apparatus  
18       is equally applicable to the manufacture of tea bags or much  
19       larger bags made of a non-porous material, such as a heat sealable  
20       plastics material, suitable for storing flowable materials such as  
21       rice or snack foods such as crisps.

22          The apparatus 10 comprises means 12 for mounting a roll of a  
23       porous heat sealable web 20. The mounting means comprises a roller  
24       12 on which the web 20 is rotatably supported. Heat sealable webs  
25       suitable for the manufacture of tea or coffee bags are well known  
26       to those skilled in the art.

27          The web 20 is fed from the mounting means to an idler roller  
28       22. It will be appreciated tensioning rollers may be provided  
29       between the roller 12 and idler roller 22 should this prove  
30       desirable. The web is disposed generally horizontally on reaching  
31       the roller 22 and is turned through 90 degrees so as to run  
32       substantially vertically downwards into a forming area in which it  
33       is caused to have a transverse cross-section which comprises two  
34       outer arms 20a each having a free end coinciding with a respective  
35       lengthwise extending edge 20b of the web, and an inverted  
36       generally V-shaped portion interconnecting the arms such that the  
37       closed end of the transverse cross-section is generally W-shaped:  
38       the closed end of the section is shown in Figures 2 and 5. For

1 ease of reference, in the description which follows the  
2 above-described transverse cross-section will be referred to as  
3 the W-section.

4 In more detail, the idler roller 22 guides the web 20 onto  
5 the wider end of a substantially triangular flow former plate 24.  
6 The former plate defines, or may have fixed to it, a W-section rib  
7 26 which extends over a relatively short distance in the  
8 lengthwise direction of the plate. A generally rectangular former  
9 plate 28 is positioned such that a lengthwise extending edge  
10 thereof extends both parallel to and substantially in the plane of  
11 the axis of the rib 26. As indicated in Figures 1 and 2, the web  
12 passes over the plate 24 and then between the plate 28 and rib 26.  
13 The arrangement is such that as the initially flat web moves  
14 through the forming area, the edges 20b are brought into a  
15 generally opposed spaced apart relationship gradually defining and  
16 increasing the length of the arms 20a and towards the end of the  
17 forming process an inward tuck (i.e. into the space between the  
18 arms) is provided at the point at which the arms 20a join, thereby  
19 defining a W-section web.

20 Two heated sealing rollers 30 are positioned downstream of  
21 the former plates 24, 28. The sealing rollers 30 are disposed in  
22 opposed spaced apart relationship and in addition to heat sealing  
23 the web to form compartments 38 for the coffee, they also serve to  
24 draw the web over the idler roller 22 in a continuous manner. Of  
25 course, other drive rollers could be provided to perform this web  
26 drawing function in addition to, or instead of, the sealing  
27 rollers 30.

28 The apparatus 10 additionally comprises a device 36 for  
29 feeding predetermined amounts of coffee to a required position  
30 between the outer arms 20a of the W-section web. In the  
31 manufacture of bags containing coffee, the device 36 is required  
32 to deliver 4 to 6 grams of coffee per bag whereas for the  
33 production of tea bags a delivery rate of 2 to 4 grams of tea is  
34 required.

35 The device 36, which is described in more detail  
36 hereinbelow, intermittently feeds predetermined amounts of coffee  
37 between the outer arms 20a of the web at a position downstream of  
38 the lowermost end of the rib 26 and immediately upstream of the

1 sealing rollers 30.

2 The sealing rollers 30 seal the web to form successive  
3 compartments 38 each of which contains a dose of coffee. As shown  
4 in Figure 3, at each end, the sealing rollers have a  
5 circumferentially extending rib 40, 42. The ribs 40, 42 are  
6 interconnected by transverse ribs 46 which extend parallel to the  
7 axis of the roller. The rollers have four such transverse ribs so  
8 that they can make four transverse seals per revolution. It will  
9 be appreciated that the ribs 40, 42, 46 define recesses 47 which  
10 in turn define the outline of the compartments 38. The trailing  
11 edge of each transverse rib 46 is relieved at 48 to provide a  
12 shock absorbing facility during filling of the compartment 38:  
13 this is described in more detail hereinbelow.

14 Severing means in the form of two reciprocating blades 49  
15 are provided downstream of the sealing rollers 30. The blades 49  
16 are arranged to cut through the seals made by the transverse ribs  
17 46 to separate the compartments from the web and thereby provide  
18 discrete bags each containing a dose of coffee. It will be  
19 appreciated that other forms of severing means may be provided.  
20 For example, instead of reciprocating blades, rollers carrying  
21 blades may be provided or the heated sealing rollers may carry  
22 cutting means. Alternatively, non-contact cutting means such as  
23 ultrasound, laser or heat cutters might be used.

24 The feeding device 36, which is shown in detail in Figure 4,  
25 comprises an inlet tube 44 which extends in a direction generally  
26 parallel to the downwardly moving web 20. The tube 44 defines a  
27 flow path for coffee C which is received from a primary source 45  
28 (Figure 1). The primary source does not form a part of the  
29 invention and since such devices will be familiar to those skilled  
30 in the art will not be described in any detail herein.

31 At its downstream end the inlet tube 44 feeds into a second  
32 tube 48. The tube 48 has its axis inclined with respect to the  
33 axis of the inlet tube. A tapering nozzle 50 is provided at the  
34 downstream end of the second tube 48. Immediately upstream of the  
35 nozzle 50, the second tube defines a chamber 52 which receives  
36 coffee from the inlet tube. An auger 56 is provided in the inlet  
37 tube 44 to pump the coffee into the chamber 52. It will be  
38 appreciated that an auger may not be required when the apparatus



1 is to be used to package materials which flow more readily than  
2 coffee.

3 The feeding device 36 has a reciprocating plunger 60  
4 positioned in the second tube 48 and arranged to be driven through  
5 the chamber 52 so as to push a wad of coffee through the nozzle 50  
6 into the space between the arms 20a of the W-section web. In  
7 Figure 4, dashed lines are used to indicate the position of the  
8 plunger at the end of a pushing stroke in which the plunger head  
9 62 is disposed at the downstream end of the nozzle having pushed a  
10 wad of coffee between the arms 20a of the web. It will be  
11 appreciated that by suitable control of the pumping action of the  
12 auger 56 and the movement of the plunger 60, wads of coffee  
13 representing a required dose of coffee can be injected between the  
14 arms 20a of the web at the required rate to ensure that each  
15 compartment 38 contains a predetermined amount of coffee. In this  
16 connection, it should be noted that the auger may be run at a  
17 constant speed or where additional control of the dose size is  
18 required may be driven at variable speeds under the control of,  
19 for example, a servo motor. In a preferred embodiment the coffee  
20 injected between the arms 20a is accelerated at about 60g where 1g  
21 has a value of  $9.80665\text{m/s}^2$ .

22 The arrangement shown in Figure 4 may be modified as shown  
23 in Figure 4a in order to provide further control of the product  
24 ejected from the dosing chamber 52. The device shown in Figure 4a  
25 is essentially the same as that shown in Figure 4 and like parts  
26 have therefore been given a common reference numeral. The Figure  
27 4a device additionally comprises a sleeve 63 which is housed  
28 coaxially in the tube 48. The plunger 60 is slidable in the sleeve  
29 which in turn is slidable in the same direction as the sleeve.  
30 There is a gap 64 between one end of the sleeve 63 and the nozzle  
31 50. The size of this gap can be altered by the aforementioned  
32 sliding movement of the sleeve which is indicated by arrow 65.  
33 Suitable means (not shown) can be provided for causing the sleeve  
34 to slide and for locking the sleeve in a desired position. By  
35 controlling the size of the gap 64 the amount of product dispensed  
36 on each downward stroke of the plunger can be controlled. As a  
37 further alternative, the sleeve may extend into the nozzle 50 such  
38 that there is no gap 64. In this case, one or more through-holes

1 (not shown) are provided in the sleeve wall. The sleeve  
2 arrangement would be such that movement of the sleeve varied the  
3 extent to which the through-hole(s) would be covered by the nozzle  
4 to facilitate control of dose size.

5 In use, the web 20 is drawn continuously over the idler  
6 roller 22 by the sealing rollers 30 and passes downwardly over the  
7 former plate 24 and between the rib 26 and plate 28. At this point  
8 the web has been formed into a W-section and a dose of coffee is  
9 injected between the outer arms 20a of the W-section web. As the  
10 web passes through the nip of the rollers 30, the open end of the  
11 W-section is pinched, bringing the free ends of the outer arms 20a  
12 together and, at regular intervals which are determined by the  
13 speed of rotation of the rollers, seals 66 which extend across the  
14 web are formed. As viewed in the drawing, the seals 66 each define  
15 the uppermost side of one compartment 38 and the lowermost side of  
16 the adjacent upstream compartment. The circumferential ribs 40, 42  
17 of the rollers seal the web at the respective lengthwise extending  
18 edges of the web. The seal 68 formed by the rib 42 serves to seal  
19 the end of the compartments 38 which is formed by pinching  
20 together the open end of the W-section web and the seals 70 formed  
21 by the rib 40 stiffen the opposite end of the compartments such  
22 that, once severed from the web, each bag can stand on that end:  
23 the latter feature is described in more detail below.

24 As mentioned above, each transverse rib 46 has its trailing  
25 edge 48 relieved. The effect of this is that subsequent to the  
26 formation of a seal 66 by a pair of opposed ribs 46, the relieved  
27 portions 48 of the ribs maintain the two sides of the web adjacent  
28 the seal in relatively close proximity for a short period of time  
29 sufficient to allow injection of a dose of coffee. This provides a  
30 degree of shock absorption by preventing injection of the coffee  
31 directly onto the seal 66.

32 Thus, each compartment 38 is successively defined and filled  
33 with a dose of coffee in a continuous process. The process  
34 commences with the sealing of the uppermost side (as viewed in the  
35 drawing) of the preceding compartment and is followed by the  
36 injection of the dose of coffee, the sealing of the right-hand  
37 side (as viewed in the drawing) of the compartment and finally  
38 with the sealing of the uppermost side. It will be appreciated

1       that coffee injection occurs when only two sides of respective  
2       compartments have been defined and the remaining two sides have  
3       not been formed.

4       It will be understood that for the purposes of defining a  
5       compartment 38, the formation of the seals 70 at the closed end of  
6       the W-section is not required. As indicated above, those seals are  
7       formed to stiffen that edge of the compartment. Referring to  
8       Figures 5 and 6 which show the closed end of the W-section web  
9       before and after sealing, it will be seen that the effect of the  
10      sealing operation is to seal the ends of the outer arms 20a which  
11      are at the inner end of the W-section to opposing portions of the  
12      respective inner arms 20c of the W-section. The effect of this  
13      operation is to form a leg 20d (Figure 6) along each side of the  
14      bag. The legs 20d are sufficiently stiff and arranged such that  
15      the bag can stand on them and also provide the compartment with a  
16      depth d (Figure 6) . One benefit of the space this provides is  
17      that the coffee contained in the compartments 38 has some freedom  
18      to move during infusion which improves the brewing process. It  
19      will be appreciated that the depth of the compartment decreases  
20      towards the seal 68. For the avoidance of any doubt, the arms 20a  
21      are shown truncated in Figures 5 and 6 so that only the closed end  
22      of the W-section web is illustrated in those Figures.

23      Those skilled in the art will be aware that heat sealable  
24      porous materials suitable for manufacturing coffee or tea bags can  
25      be readily obtained. Such materials typically come in the form of  
26      a web which on one side has a heat curable adhesive which may, for  
27      example, comprise polypropylene fibres. A heat curable adhesive is  
28      indicated at 20e in Figure 5. Thus, whilst the heated sealing  
29      rollers can cause the inner sides (as viewed in Figure 5) of the  
30      respective pairs of arms 20a, 20c to adhere to one another, the  
31      outer surfaces of the inner arms 20c should not and therefore the  
32      W-section can be maintained after sealing.

33      An alternative form of sealing roller for sealing the web is  
34      shown in Figure 7. The sealing rollers 130 each have a plurality  
35      of ribs disposed on the roller surface 132. There are two ribs  
36      140, 142 extending circumferentially about the roller surface 132  
37      and four ribs 146 extending parallel to the roller axis. The ribs  
38      146 extend between the circumferential ribs 140, 142. Additional

1 ribs 148, one on each side of each transverse rib 146, extend  
2 between the transverse ribs and the circumferential rib 140. The  
3 ribs 140, 142, 146, 148 define hollows 149 which define the  
4 outline of the coffee containing compartments formed by the  
5 sealing rollers 130. Although not shown, it is preferable that the  
6 trailing edges of the ribs 146 are relieved in the same way as the  
7 transverse ribs 46 of the sealing rollers 30.

8 The circumferential rib 140 serves to seal in the region of  
9 the closed end of the W-section and the inclined ribs 148 increase  
10 the area of sealing in that region thereby increasing the overall  
11 stiffness of the base region of the coffee bag. This also  
12 increases the ability of the bag to define a compartment which has  
13 depth.

14 Figure 8 shows an alternative feeding device 150 for feeding  
15 flowable material between the outer arms 20a of the W-section web.  
16 The device 150 comprises a tube 152 with a nozzle 154 at its  
17 downstream end. A servo-driven auger 156 is housed in the tube 148  
18 and extends into the nozzle 154. The auger is driven  
19 intermittently to pump doses of coffee into the W-section web. By  
20 means of the servo drive, the amount of coffee pumped by the auger  
21 can be regulated to ensure that the required dosage of coffee is  
22 achieved. It will be appreciated that the sleeve arrangement  
23 described with reference to Figure 4a may also be used with the  
24 feeding device 150.

25 Figure 9 shows yet another alternative feeding device 236.  
26 The device 236 has two inlet feed tubes 248 which are disposed in  
27 parallel spaced apart relationship and a fixed plate 249 which has  
28 a centrally located through-hole in which a nozzle 250 is located.

29 A sliding plate 252 is arranged between the inlet tubes 248  
30 and the fixed plate 249. The sliding plate defines two  
31 through-holes 254.

32 A reciprocal plunger 260 is disposed between the inlet tubes  
33 248 in alignment with the nozzle 250.

34 The arrangement of the device 236 is such that in a first  
35 position (as shown) one of the through-holes 254 is in alignment  
36 with its feed tube 248 whilst the other is aligned with the nozzle  
37 250 and plunger 260. In combination with the fixed plate 240, the  
38 through-hole 254 in alignment with the feed tube 248 defines a

1 circular dosing chamber which is fed with coffee from the aligned  
2 feed tube. An auger (not shown), or other form of device capable  
3 of pushing the coffee along the feed tube is provided to push  
4 coffee from the feed tube into the dosing chamber defined by the  
5 through-hole 254 and fixed plate 249.

6 The through-hole 254 aligned with the nozzle 250 carries a  
7 dose of coffee received from its inlet tube 248 and defines with  
8 the nozzle a continuous through-passage into which the plunger is  
9 driven. When the plunger is driven through the through-hole into  
10 the nozzle, the dose of coffee is displaced into the space between  
11 the outer arms 20a of the W-shaped web.

12 It will be appreciated that by causing the plate 252 to move  
13 back and forth, one through-hole 254 can be filled with coffee  
14 from its inlet tube 248 whilst a dose of coffee contained in the  
15 other through-hole is pushed through the nozzle by the plunger  
16 260.

17 The augers or other devices used to push coffee from the  
18 inlet tubes 248 into the respective through-holes can be regulated  
19 to control the density of the dose of coffee contained in the  
20 dosing chambers and to prevent bridging.

21 It will be understood that whilst in the embodiment the  
22 movement of the plate 252 is translational, subject to a suitable  
23 arrangement of the tubes 248, nozzle 250, through-holes 254 and  
24 plunger 260 on a common radius, the plate could have a reciprocal  
25 rotational movement.

26 It will be appreciated that if the device 236 is to be used  
27 to feed materials which flow more readily than ground coffee, it  
28 may be possible to rely on gravity feed to the dosing chambers and  
29 dispense with pushing devices in the inlet tubes.

30 The feed devices 36 and 236 whilst more complex than the  
31 device 150 provide advantages in terms of their greater operating  
32 speeds. With a servo-driven auger as shown in Figure 8, the speed  
33 of operation is limited by the rate at which the auger can be  
34 accelerated and decelerated each time it is operated to inject a  
35 dose of coffee. In the case of the devices 36 and 236 the auger,  
36 or such pushing devices as may be used with the device 236, can be  
37 in constant operation and the speed of operation is limited by the  
38 speed of the reciprocating parts. It is anticipated that the

1 apparatus 10 will be capable of producing between three hundred  
2 and one thousand bags per minute and that the feed devices 36 and  
3 236 will be required for operating at the upper end of that range.  
4 It will be appreciated that whilst the embodiments have been  
5 described in connection with a heat sealable material, it would be  
6 possible for the bags to be made of other materials with an  
7 adhesive being applied upstream of the sealing rollers.

8 It will be understood that although the sealing rollers  
9 shown in Figures 3 and 7 have four transverse ribs, the number of  
10 ribs per roller may be different. For example, for the purposes of  
11 producing large bags, each roller may have only one transverse  
12 rib.

13 The sealing rollers may be provided with resilient inserts  
14 made of, for example, silicone rubber in order to aid the sealing  
15 process where it is desired to provide an airtight seal. As an  
16 alternative and to provide the same effect, the ribs of the  
17 sealing roller may resiliently biased outwardly of the roller  
18 surface.

19 It will be appreciated that instead of a triangular flow  
20 former plate, a circular or oval former plate may be used and that  
21 instead of a fixed former plate a rotatably mounted disc could be  
22 used with the circumferentially extending edge of the disc being  
23 substantially in the plane of the longitudinal axis of the  
24 W-section web 26.

25 It will be appreciated that in its broadest aspect, the  
26 invention provides an apparatus and method for continuously  
27 manufacturing DOY bags in which the bags are formed by operations  
28 on a downwardly moving web. It will also be appreciated that the  
29 invention provides an apparatus and method for producing a DOY bag  
30 in which the flowable material to be contained in the bag is  
31 injected from the side rather than from above the web and before  
32 the compartments which contain the material have been formed.

33 It will also be appreciated that the invention provides an  
34 apparatus and a method of manufacturing a DOY bag which may be  
35 continuous rather than intermittent.

36 It will be appreciated that the embodiment provides an  
37 integral sealing station at which all of the bag seals (which  
38 extend in three different directions) are formed between two

1 sealing members.

2 Although, it is anticipated the apparatus will capable of  
3 producing up to one thousand bags per minute, it is believed that  
4 a preferable speed range will be between 300 and 700 bags per  
5 minute.

6 Preferably, the device extends generally parallel to the web  
7 20 and injects material into the space between the arms 20a at an  
8 angle in the region of 10° to the vertical. The angle of injection  
9 may be between 5° and 30° to the vertical.

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

26

27

28

29

30

31

32

33

34

35

36

37

38

CLAIMS

1. Apparatus for use in manufacturing packaging containing a flowable material, said apparatus comprising flow forming means for causing a moving web to have a transverse cross-section which comprises two arms and a portion interconnecting said arms which portion extends inwardly into a space defined between said arms, sealing means disposed downstream of said forming means for sealing said web to define successive closed compartments and means for feeding a flowable material into said space between said arms at a position upstream of said sealing means such that each said compartment contains a predetermined amount of said flowable material.

2. Apparatus as claimed in claim 1, wherein said forming means causes said inwardly extending portion to be substantially V-shaped such that a closed end of said transverse cross-section is substantially W-shaped.

3. Apparatus as claimed in claim 1 or 2, wherein said flow forming means comprises a generally triangular flow forming plate.

4. Apparatus as claimed in claim 3 when dependent on claim 2, wherein said forming plate carries or defines a W-section rib means which defines a substantially W-section rib and said forming means further comprises means defining an edge aligned with the lengthwise axis of said W-section rib and arranged such that said web passes between said rib and said edge.

5. Apparatus as claimed in any one of claims 1 to 4, wherein said web is caused to move continuously.

6. Apparatus as claimed in any one of the preceding claims, wherein said web is caused to move by said sealing means.

7. Apparatus as claimed in any one of the preceding claims, wherein said sealing means comprises two heated rollers



1 disposed in opposed spaced apart relationship.

2  
3 8. Apparatus as claimed in any one of the preceding  
4 claims, wherein said web is caused to move downwardly past said  
5 forming means and said feeding means.

6  
7 9. Apparatus as claimed in any one of the preceding  
8 claims, wherein said flowable material is fed between said arms in  
9 a direction transverse to said direction of movement of the web.

10  
11 10. Apparatus as claimed in any one of the preceding  
12 claims, comprising severing means for severing said compartments  
13 from said web to form discrete bags each comprising a said  
14 compartment.

15  
16 11. A method of manufacturing packaging containing a  
17 flowable material comprising the steps of:

18  
19 (i) causing a moving web to have a transverse  
20 cross-section which comprises two arms and a portion  
21 interconnecting said arms which portion extends  
22 inwardly into a space defined between said arms;

23  
24 (ii) forming a first seal and subsequently a second seal,  
25 said seals being spaced apart in the lengthwise  
26 direction of said web and each extending across said  
27 web in a lengthwise direction of said arms;

28  
29 (iii) forming a third seal extending between said first seal  
30 and said second seal in said lengthwise direction of  
31 the web in the region of said lengthwise extending  
32 edges so as to define a closed compartment; and

33  
34 (iv) feeding a predetermined amount of a flowable material  
35 into said space between said arms prior to forming  
36 said second seal and at least prior to completion of  
37 said third seal such that said material will be  
38 contained in said compartment.

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38

12. A method as claimed in claim 11, wherein said web is fed downwardly during said forming, feeding and sealing steps.

13. A method as claimed in claim 11 or 12, comprising the step of forming respective fourth seals between respective inner surfaces of said arms and said interconnecting portion which seals are extended between said first seal and said second seal and in the lengthwise direction of the web.

14. A method as claimed in claim 13, wherein said fourth seals and said third seal are formed simultaneously.

15. A method as claimed in any one of claims 11 to 14, wherein said interconnecting portion is caused to be substantially V-shaped such that a closed end of said transverse cross-section is generally W-shaped.

16. A method as claimed in any one of claims 11 to 15, wherein said web is caused to move continuously so as to define successive compartments each containing a predetermined amount of said material.

17. A method as claimed in claim 16, comprising forming more than one hundred compartments per minute.

18. A method as claimed in claim 17, comprising forming three hundred to seven hundred compartments per minute.

19. A method as claimed in any one of claims 11 to 18, wherein said web consists of a porous material for permitting infusion.

20. A method as claimed in claim 19, wherein said flowable material is tea or coffee.

21. A method as claimed in any one of claims 11 to 20, comprising the step of severing said compartments from said web to

1 form discrete bags containing said flowable material.

2  
3 22. A method as claimed in any one of claims 11 to 21,  
4 wherein said flowable material is fed between said opposed arms in  
5 a direction transverse to the lengthwise direction of said web.

6  
7 23. Apparatus for use in manufacturing packaging  
8 containing a flowable material, said apparatus comprising forming  
9 means for causing a moving web to have a transverse cross-section  
10 which comprises two arms and a portion interconnecting said arms  
11 which portion extends into a space defined between said arms,  
12 means for feeding a flowable material into said space between said  
13 arms and sealing means for sealing said web so as to define  
14 successive compartments each containing a predetermined amount of  
15 said flowable material, the arrangement being such that said web  
16 moves downwardly past said forming means, feeding means and  
17 sealing means.

18  
19 24. Apparatus as claimed in claim 23, wherein said  
20 downwards movement is substantially vertically downwards.

21  
22 25. Apparatus as claimed in claim 23 or 24, wherein said  
23 feeding means is arranged to feed said flowable material in a  
24 direction transverse to said downward movement.

25  
26 26. Apparatus as claimed in claim 23, 24 or 25, wherein  
27 said downwards movement is caused by said sealing means.

28  
29 27. Apparatus as claimed in any one of claims 23 to 26,  
30 wherein said sealing means comprises two heated rollers disposed  
31 in opposed spaced apart relationship.

32  
33 28. Apparatus as claimed in any one of claims 23 to 27,  
34 comprising severing means for severing said compartments from said  
35 web to form discrete bags each comprising a said compartment.

36  
37 29. Apparatus as claimed in any one of claims 23 to 28,  
38 wherein said flowing means comprises a generally triangular flow

1 forming plate.

2  
3 30. Apparatus as claimed in claim 29, wherein said forming  
4 plate defines a W-section rib or carries means defining a  
5 substantially W-section rib and said forming means further  
6 comprises means defining an edge aligned with the lengthwise axis  
7 of said W-section rib and arranged such that said web passes  
8 between said rib and said edge.

9  
10 31. A method of manufacturing packaging containing a  
11 flowable material comprising the steps of:

- 12  
13 (i) causing a web to move in a downwards direction;  
14  
15 (ii) causing said downwardly moving web to have a  
16 transverse cross-section which comprises two arms and  
17 a portion interconnecting said arms which portion  
18 extends inwardly into a space defined between said  
19 arms;  
20  
21 (iii) feeding a flowable material into said space; and  
22  
23 (iv) sealing said web so as to define successive  
24 compartments each containing a predetermined amount of  
25 said flowable material.

26  
27 32. A method as claimed in claim 31, wherein said  
28 flowable material is fed between said arms in a direction  
29 transverse to said downwards direction.

30  
31 33. A method as claimed in claim 31 or 32, wherein said  
32 step of sealing said web includes simultaneously forming (i)  
33 respective seals between respective inner surfaces of said arms  
34 and said interconnecting portion and (ii) a seal in the region of  
35 said lengthwise extending edges, each of said seals extending  
36 continuously in the lengthwise direction of said web.

37  
38 34. A method as claimed in claim 31, 32 or 33, wherein

1 said web comprises a porous material to permit infusion.

2

3 35. A method as claimed in claim 34, wherein said flowable  
4 material is coffee or tea.

5

6 36. A device for feeding a predetermined amount of  
7 flowable material into a container, said device comprising inlet  
8 means for receiving said flowable material, means defining at  
9 least one dosing chamber, means for driving said flowable material  
10 from said inlet means to the or each said dosing chamber, and  
11 reciprocating means movable through the or each said dosing  
12 chamber to drive a predetermined amount of said flowable material  
13 into said container.

14

15 37. A device as claimed in claim 36, comprising movable  
16 sleeve means arranged to define at least one selectively variable  
17 size inlet to the or each said dosing chamber.

18

19 38. A device as claimed in claim 36 or 37, wherein said  
20 driving means comprises at least one auger.

21

22 39. A device as claimed in claim 38, wherein the or each  
23 auger is servo driven.

24

25 40. A device as claimed in claim 37, 38 or 39, wherein  
26 said inlet means is arranged such that said flowable material is  
27 fed into said chamber in a direction transverse to the direction  
28 of movement of said reciprocating means.

29

30 41. A device as claimed in claim 37, 38 or 39, wherein  
31 said chamber defining means defines two said dosing chambers, said  
32 inlet defining means defines respective passages feeding to said  
33 dosing chambers and the arrangement is such that said chamber  
34 defining means is movable between a first position in which a  
35 first of said chambers is aligned with said reciprocating means  
36 and a second of said chambers is in a position to receive said  
37 flowable material from the respective said passage and a second  
38 position in which said second chamber is aligned with said

1 reciprocating means and said first chamber is in a position to  
2 receive said flowable material from the respective said passage.

3  
4 42. A device as claimed in claim 41, wherein said chamber  
5 defining means comprises a plate which has respective  
6 through-holes defining said chambers, said plate being movable in  
7 translation between said first position and said second position.

8  
9 43. A device as claimed in any one of claims 36 to 42,  
10 wherein said reciprocating means comprises an axially slidable  
11 plunger.

12  
13 44. A device for feeding a predetermined amount of  
14 flowable material into a container, said device comprising means  
15 defining at least one outlet, means defining a plurality of dosing  
16 chambers, inlet means for receiving said flowable material, means  
17 for driving said flowable material from said inlet means to said  
18 dosing chambers, means for pushing said flowable material out of  
19 said dosing chambers to said outlet defining means and means for  
20 causing relative reciprocal movement between said outlet defining  
21 means and said chamber defining means, the arrangement being such  
22 that each said chamber can be positioned in alignment with said  
23 pushing means and said outlet means whilst the or at least one  
24 other chamber receives flowable material from said inlet means.

25  
26 45. A device as claimed in claim 44, wherein said outlet  
27 defining means is fixed and said chamber defining means comprises  
28 a slidable plate having respective through-holes defining each  
29 said dosing chamber.

30  
31 46. A device as claimed in claim 44 or 45, wherein said  
32 relative movement is translational movement.

33  
34 47. A device as claimed in claim 44, 45 or 46, having two  
35 said dosing chambers and one said outlet.

36  
37 48. A device as claimed in any one of claims 44 to 47,  
38 wherein said driving means is disposed in said inlet means.

1  
2 49. A device as claimed in any one of claims 44 to 48,  
3 wherein said driving means comprises at least one auger.  
4

5 50. A device as claimed in any one of claims 44 to 49,  
6 wherein said pushing means comprises at least one reciprocating  
7 plunger.  
8

9 51. Apparatus as claimed in any one of claims 1 to 10 or  
10 23 to 28, wherein said feeding means comprises a device as claimed  
11 in any one of claims 36 to 43 or 44 to 50.  
12

13 52. Apparatus as claimed in any one of claims 1 to 10 or  
14 23 to 28 or 51, wherein each said arm has a free end and said free  
15 ends coincide with respective lengthwise extending edges of said  
16 web.  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38





2/3

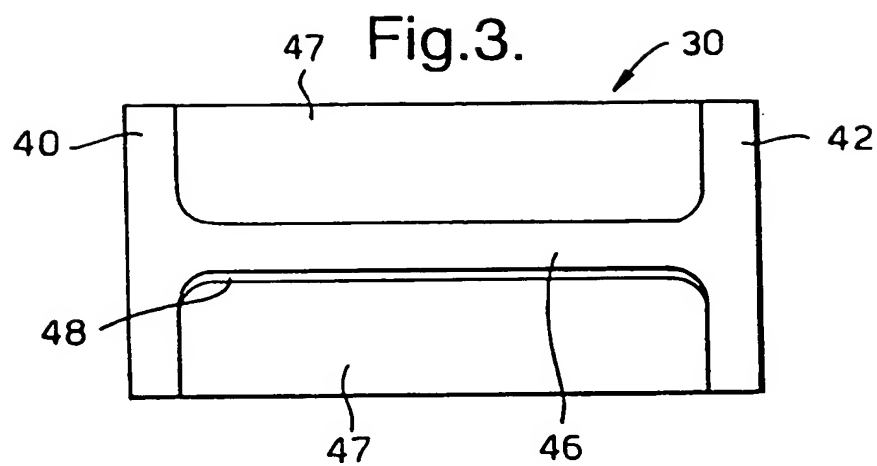


Fig.4.

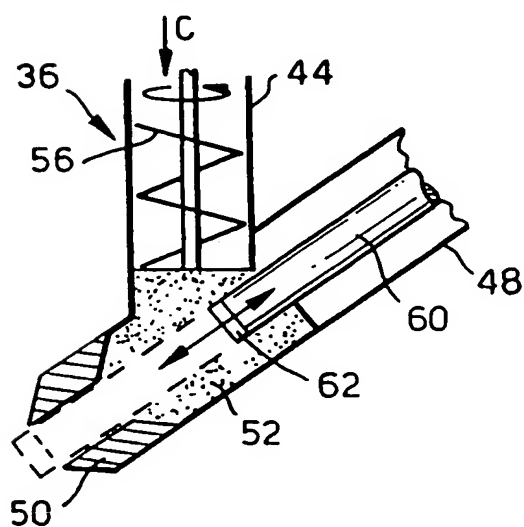


Fig.4 a.

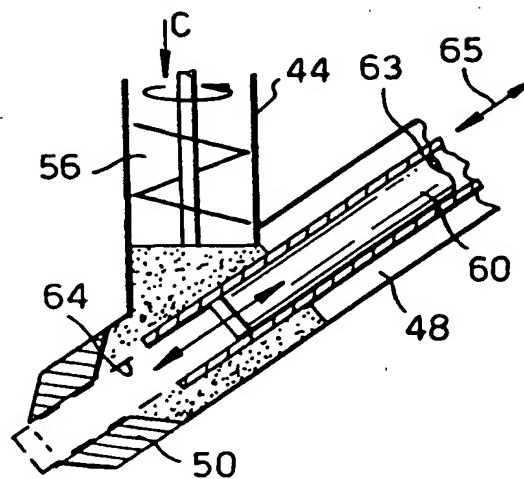


Fig.9.

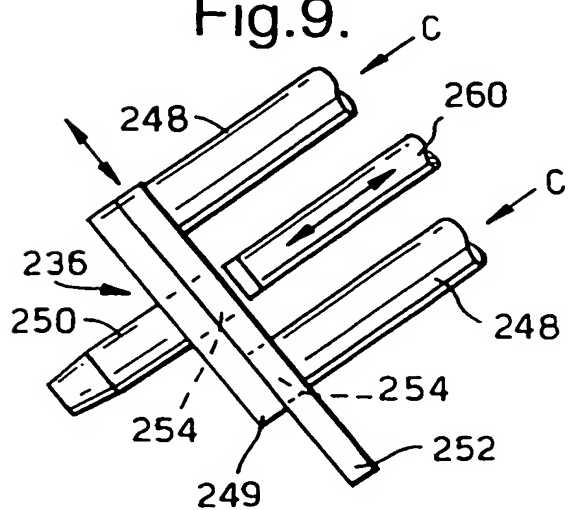
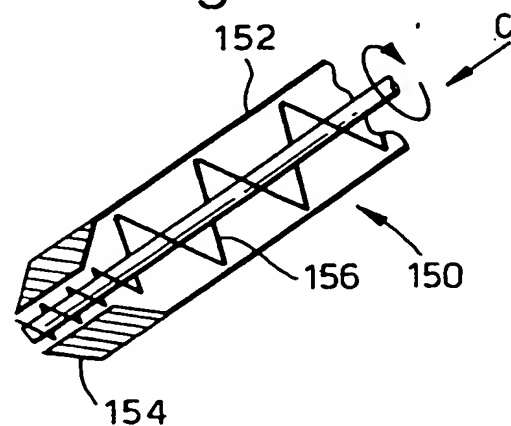


Fig.8.



3/3

Fig.5.

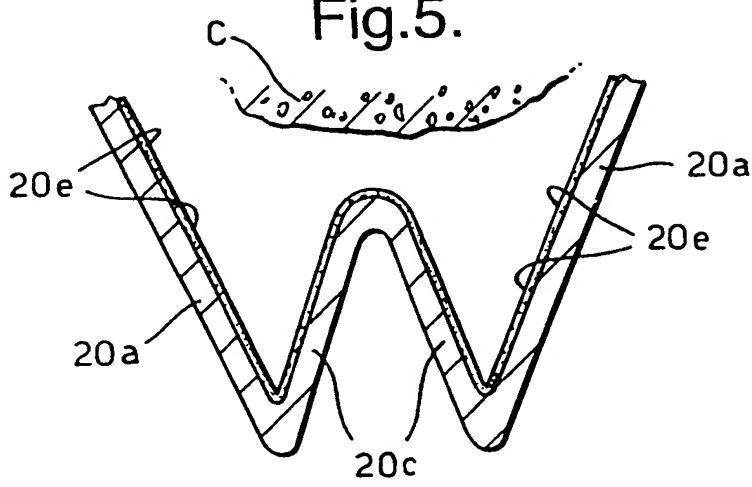


Fig.6.

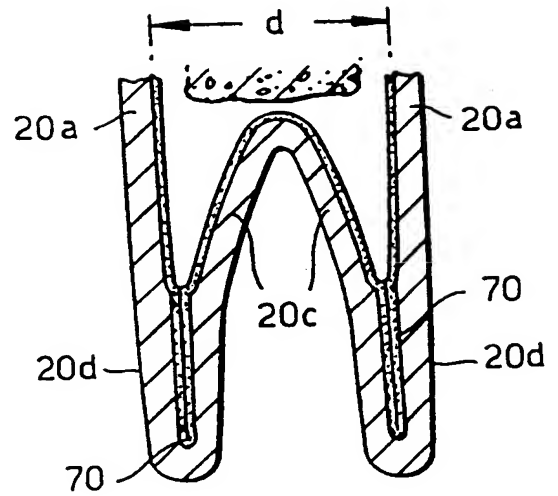


Fig.7.

